## Space Weather Technical Forecast

Issued on Monday 18 November 2024 at 00:58 Local

**This technical forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

---

**Space Weather Forecast Headline: Faster solar winds bring a chance Minor Geomagnetic Storms (G1) at times.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has been Low during the past 24 hours, with only C-class flares observed. The largest was a C5.3 at 17/1059 UTC, probably from a new and currently unnumbered region near the northeast limb.

There are currently nine sunspot regions on the visible disc, with AR3895 having faded and AR3897 , AR3898 and AR3899 numbered. Two remaining unnumbered regions rounding the eastern limb. The largest sunspot region remains AR3889 in the west, although this region continue to show simplification and a lack of activity. There are a number of unnumbered sunspot regions emerging on the disc, including a cluster near the southeast limb, which is currently difficult to analyse due to foreshortening effect and for now attributed to one region although this subject to change.

No Earth-directed CMEs were observed over the past 24 hours in available imagery.

**Solar Wind / Geomagnetic Activity:** Solar winds at L1 measured by ACE were indicative of a slow-regime, with speeds between 320-360km/s. The solar wind density was below average. The interplanetary magnetic filed (IMF), Bt, was weak 6-8nT. The north-south component also varying weakly, +6/-6nT. The phi angle was mostly positive (away from the Sun), but briefly re-orientated to negative between 17/1050 UTC and 17/1228 UTC. The net result of the above solar wind measures was Quiet (0-2Kp) geomagnetic activity.

**Energetic Particles / Solar Radiation:** High energy proton flux observed by GOES18 remained at Background levels.

High energy electron flux (greater than 2MeV) observed by GOES16 was at Normal Background to Moderate levels, with a diurnal peak of 495pfu observed at 17/1430 UTC. The associated 24-hour fluence remained below the Active threshold, and the 24-hour integrated flux observed at 17/2359 UTC was 1.7e7.

---

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

# Space Weather Technical Forecast

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Low to Moderate activity is expected, with the arriving regions contributing to a daily chance of M-class flares and a persistent slight chance of isolated X-class flares.

**Solar Wind / Geomagnetic Activity:** No Earth-directed CMEs currently feature in the forecast.

The forecast is dominated by coronal hole fast winds. An enhancement is expected early in the period, with a likelihood of elevated wind speeds, 450-500km/s, occurring for a time during Day 1 (18 Nov) or more likely into Day 2 (19 Nov). Wind may wane into Day 3 (20 Nov) but with the threat of further enhancement to slight elevated or elevated levels by Day 4 (21 Nov).

Quiet to Unsettled (Kp1-3) conditions expected through much of the period, with a chance of Active (Kp4) intervals through Days 1 and 2 (18-19 Nov), and a slight chance of a G1 Minor Geomagnetic storm (Kp5). Activity expected to increase through Day 4 (21 Nov) becoming generally Unsettled to Active (Kp3-4) with a chance of G1-2 Minor to Moderate Geomagnetic Storm intervals.

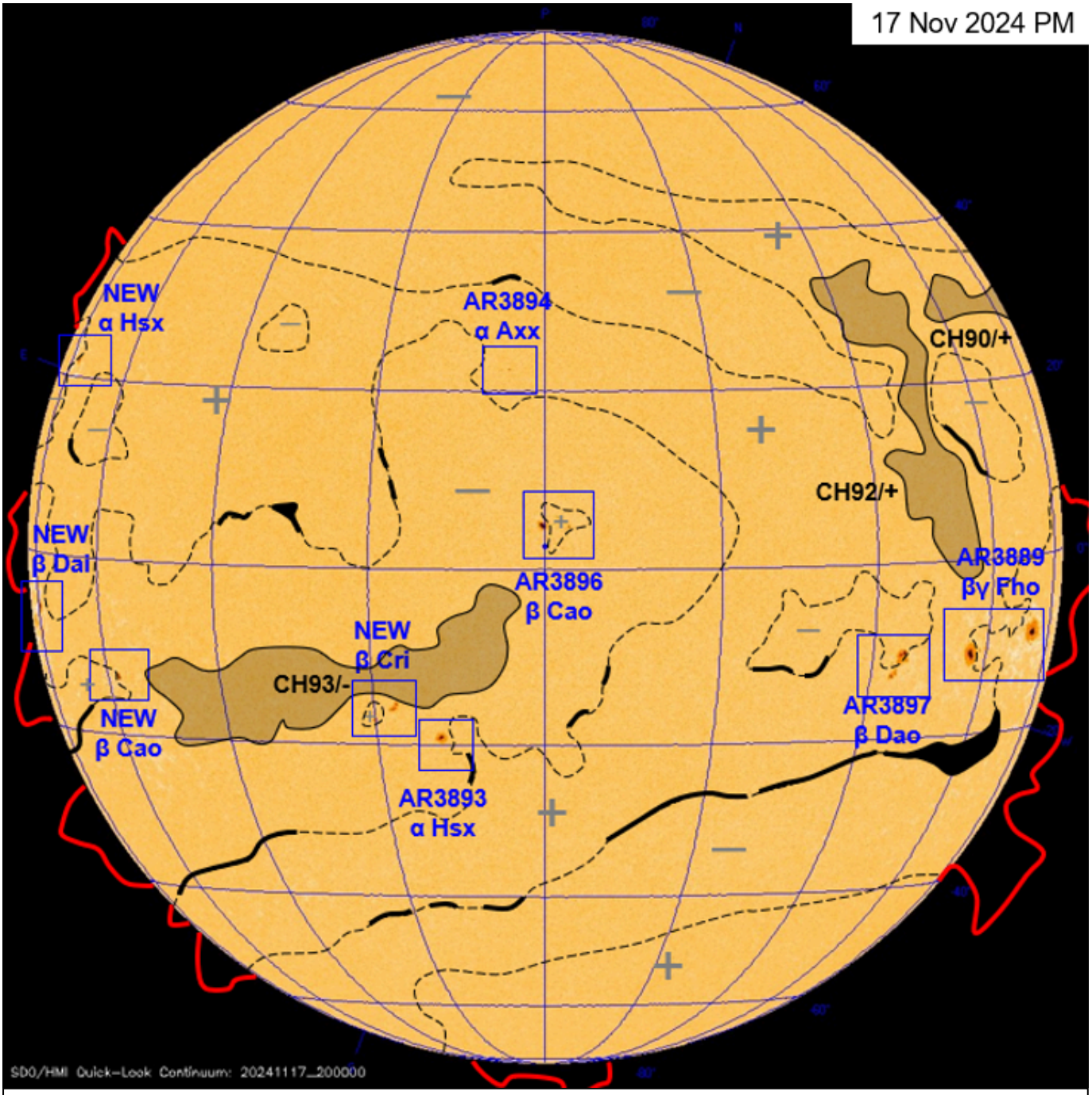
**Energetic Particles / Solar Radiation:** There is a daily Slight Chance of S1/Minor solar radiation storms due to AR3889's position as it nears the western limb.

Current Moderate to diurnally High energy electron flux at GEO may continue early in the period, before likely becoming suppressed by the onset of a faster solar wind from CH92/+. The associated fluence most likely remaining below the Active (1e8 integrated flux) threshold.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

**Figure 1: Solar Synoptic Map Valid 17/2000 UTC.**




**Key:** Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

## Geomagnetic Storms

No CMEs feature in the forecast. However, there a very low possibility of a glancing CME blow, from a filament lift-off from the southwest quadrant, on the 15 Nov, this should pass ahead of Earth's orbit early on Day 1 (18 Nov) with no impacts currently expected from this feature.

The forecast is dominated by coronal hole fast winds, with two main source regions on the visible disk. An enhancement from CH92/+ in the west is expected early in the period, with a likelihood of elevated wind speeds, 450-500km/s, occurring for a time during Day 1 (18 Nov) or more likely into Day 2 (19 Nov). Wind may wane into Day 3 (20 Nov) but with the threat of further enhancement to slight elevated or elevated levels by Day 4 (21 Nov) with the increasing risk of enhancement from the large CH93/- now approaching centre disk. An increase in solar winds to 550-600km/s is currently suggested by MOSWOC ENLIL output , although this viewed with caution, perhaps too early to bring in any enhancement.

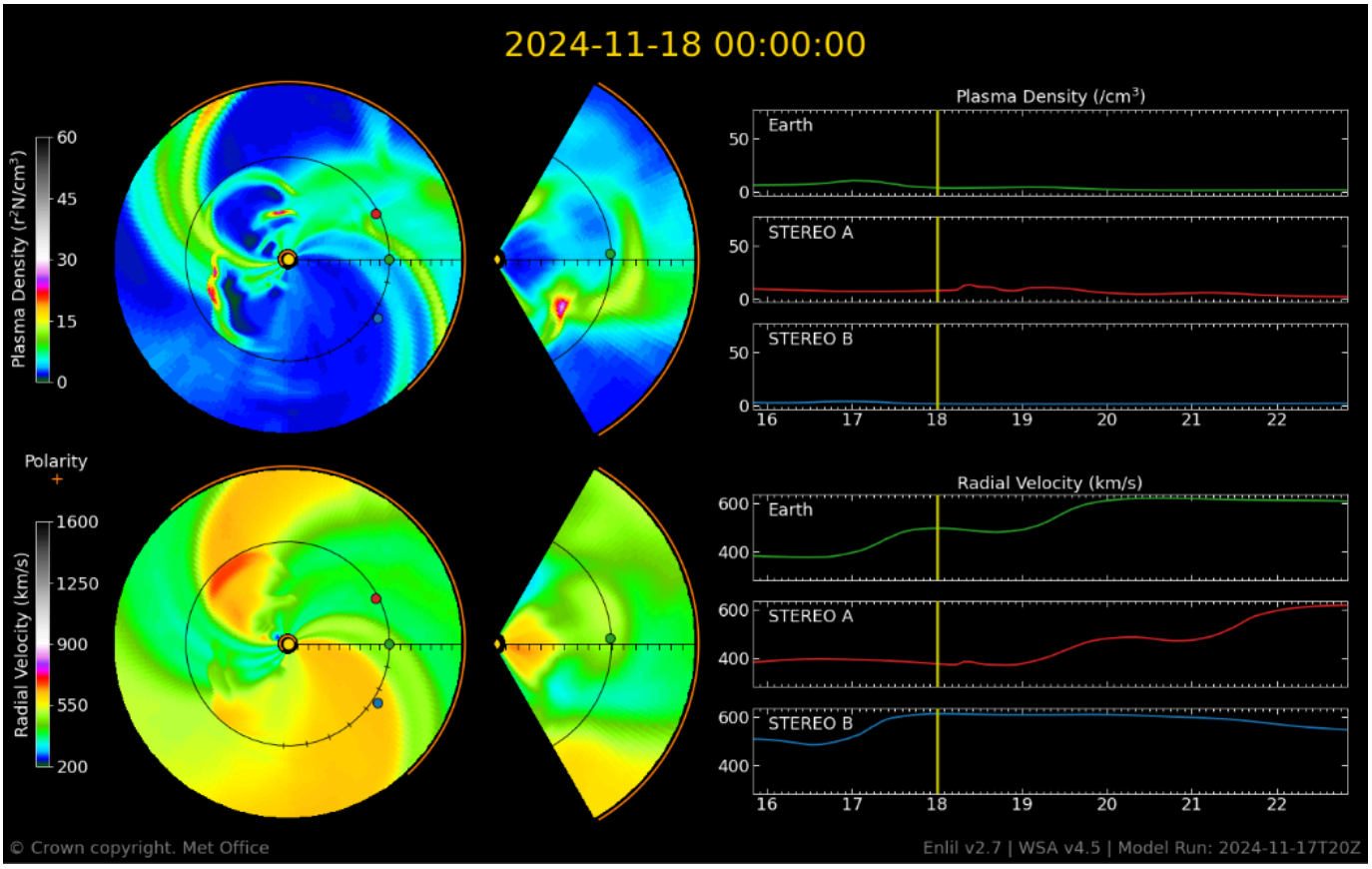
Quiet to Unsettled (Kp1-3) conditions expected through much of the period, with a chance of Active (Kp4) intervals through Days 1 and 2 (18-19 Nov), and a slight chance of a G1 Minor Geomagnetic storm (Kp5). Activity expected to increase through Day 4 (21 Nov) becoming generally Unsettled to Active (Kp3-4) with a chance of G1-2 Minor to Moderate Geomagnetic Storm intervals depending on the strength of any enhancement from CH93/- and any associated CIR region.

| Geomagnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 10 | 10 | 1 | 30 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

**Figure 2: Latest MOSWOC ENLIL output.**






© Crown Copyright 2024. All Rights Reserved.

## Radio Blackouts - X-Ray Flares

Of the current front-sided sunspot groups, AR3889 in the southwest has historically carried the bulk of the current flare risk, but has steadily reduced somewhat given the recent simplification of the region, with oncoming spots looking to increasingly represent the highest flare risk despite appearing smaller and magnetically simpler at this time.

No particularly large far side regions are suggested by far-side sounding data, however recurrence suggest the position of a number of region near the eastern limb and this minimises and reduces confidence in the signal from soundings. Recurrence, supported by brightening and magnetic looping on the eastern limb in SDO/AIA imagery and recent far-sided CMEs, continue to suggest the potential for sunspot regions to return to the visible disc over the period. Likely the first of which already emerging onto the east limb, currently difficult to analyse due to foreshortening.

Overall Low to Moderate activity is expected, with the arriving regions contributing to a daily chance of M-class flares and a persistent slight chance of isolated X-class flares, with the risk maintained steady through the period pending further developments.

| X-Ray Flares | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability | | | (%) | (%) | (%) | (%) |
| Active | R1-R2 (M Class) | No | 30 | 30 | 30 | 30 |
| Very Active | R3-R5 (X Class) | No | 5 | 5 | 5 | 5 |

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

## Solar Radiation Storms (High Energy Protons)

There is a slight chance of S1/Minor Solar Radiation storms over the period, chiefly due to any potential significant flaring from AR3889 as it approaches and rounds the western solar horizon. The series of inbound eastern limb regions are unlikely to present any appreciable risk to the daily probabilities of S1 in the near term.

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}sr^{-1}s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| **Active** | **≥ S1** | No | 5 | 5 | 5 | 5 |
| **Very Active** | **≥ S3 *** | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

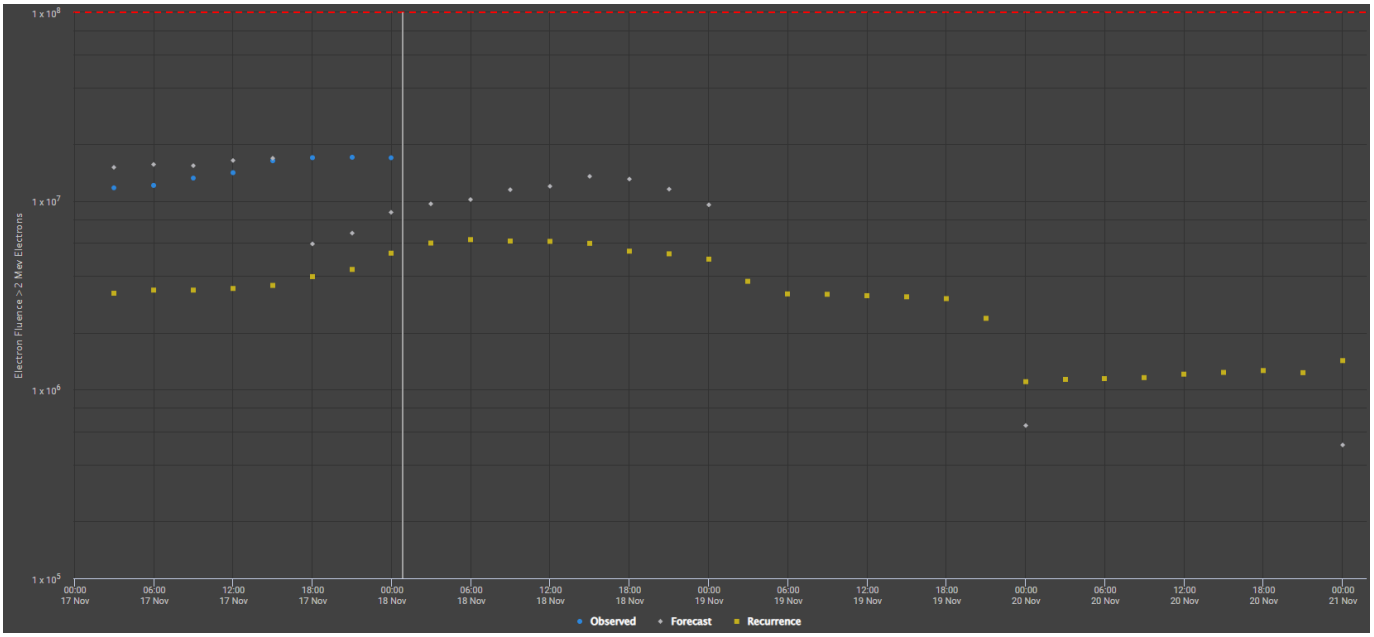
© Crown Copyright 2024. All Rights Reserved.

## High Energy Electrons (≥ 2MeV)

Current Moderate to diurnally High energy electron flux at GEO may continue early in the period, before likely becoming suppressed by the onset of a faster solar wind from CH92/+. The initial values unlikely to be of sufficient magnitude to trouble the Active 24-hour integrated threshold - no persistent feature on the disc has resulted in Active fluence. All considered, there is a slight chance of Active fluence, peaking early in the period. MOSWOC REFM model viewed as providing reasonable guidance.

| GEO Electron Environment | Level ($cm^{-2}sr^{-1}$ $day^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability (Exceedance) | | | (%) | (%) | (%) | (%) |
| Active | ≥ 2 MeV ≥ $1\times10^{8}$ | No | 5 | 5 | 1 | 1 |
| Very Active | ≥ 2 MeV ≥ $1\times10^{9}$ | No | 1 | 1 | 1 | 1 |

**Figure 3: Latest MOSWOC REFM output.**




Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.